Assignment 06

Deliver the work in **ALL** MATLAB, Python, and R with the same data as in the sample code. You however save the data in an Excel workbook and your code should read data from it.

1. (2.5 points) **Derive** and **code** the DEA constrained optimization problem that maximizes

$$E_d = \frac{\sum_{j=1}^{M} u_j O_{dj}}{\sum_{i=1}^{N} v_j I_{dj}}$$

By fixing the numerator to 1, and minimizes the denominator.

2. (2.5 points) **Derive** and **code** the constrained optimization problem that maximizes

$$\sum_{j=1}^{M} u_j O_{dj} - \sum_{i=1}^{N} v_j I_{dj}$$

with the following constraints:

$$\sum_{i=1}^{N} v_j I_{dj} = 1$$

$$\sum_{j=1}^{M} u_j O_{dj} \leq \sum_{i=1}^{N} v_j I_{dj}, \quad d = 1, \dots, D$$

$$v_j \geq 0, \qquad i = 1, \dots, M$$

$$u_j \geq 0, \quad j = 1, \dots, N,$$

Bonus: 5 points for comparable code in SAS IML

Note: Any question should have all the languages to get credits. A Word document MUST accompany the code to FULLY explain your work.